Microtrak, UK), used routinely in the hospital laboratory. Using the expanded "gold standard" suggested by Thejls *et al*[6] we considered a patient infected with *C trachomatis* if they tested positive on the two tests. There were no discordant EIA and DFA test results.

Thirty-one patient-records (13 men and 18 women) were available for analysis. Table 1 summarises the demographic, clinical and laboratory details. We also identified case-notes for 21 patients who had attended the GUM clinic as known sexual contacts of individuals with concomitant gonococcal and chlamydial infections. Table 2 summarises the clinical and laboratory findings in the 21 sexual contacts.

Of the 92 cases of gonorrhoea diagnosed in our clinic in 1993/94, 31 (33·7%) had concomitant chlamydial infection, and this is within the range reported by others.[1–5] The mean age of men and women correlates with the reported age for gonorrhoea in the west Midlands.[7] Most of the infections (84%) were acquired locally. It is reassuring that 94% attended the scheduled two tests of cure and none of the patients defaulted without treatment. Most of the men (92%) were symptomatic, compared with 39% of the women. This finding seems to emphasise the importance of assiduous contact tracing in the control of STDs in women. All the men had post-gonococcal urethritis (PGU), on microscopy, which responded to doxycycline.

Sexual contacts of 23 (74%) patients were traced. Twenty-one sexual contacts were available for analysis as shown in table 2.

Table 1 Demographic, clinical and laboratory data

Feature	*Male*	*Female*	*Total*
Number	13	18	31
Age in years (mean)	24	20	22
Number unemployed (%)	2 (15·4)	7 (38·8)	9 (29)
Number symptomatic (%)	12 (92·3)	7 (38·8)	19 (61·3)
Antibiotics in last 3 months	0	2	2
Condom used in last 3 months	1	1	2
Test of cure done	13 (100)	16 (88·8)	29 (92·5)
Source of infection (%):			
Local	11 (84·6)	15 (83·3)	26 (83·9)
UK	1	2	3
Europe	1	0	1
Africa	0	1	1
Partners in last 3 months (mean)	1·5	1·6	
Last coitus (mean days)	6·4	12·9	
Past STD	2	2	4
Mode of attendance (%):			
Self referral	5	2	7 (22·6)
GP referral	6	5	11 (35·5)
Contact slip	2	11	13 (41·9)
Contacts traced (%)	9 (69·2)	14 (77·7)	23 (74·2)

STD = Sexually transmitted disease.

Table 2 Clinical and laboratory findings in sexual contacts

Feature	*Male*	*Female*	*Total*
Number	12	9	21
Age (mean)	23·5	20·4	
Last coitus (days)	7·5	12·6	
Condom used in past 3 months	1	1	2
Antibiotics in past 3 months	0	1	1
NG and CT positive	5	6	11 (52%)
Only NG isolated	5	0	5 (25%)
Only CT positive	1	0	1 (5%)
NG and CT negative	1	3	4 (19%)

NG = *N gonorrhoeae*
CT = *C trachomatis*

Eleven (52%) patients acquired both infections, while 4 (19%) apparently eluded both infections. Transmission rate was higher for gonorrhoea than chlamydia (76% versus 52%), and this is similar to Lycke *et al*'s findings.[8] In Lycke *et al*'s study the transmission was higher for sole gonococcal infections than dual infections with chlamydia; whereas that for chlamydia was the same for sole and dual infections.[8] Reasons for this finding are as yet unknown. Although our numbers are small, on comparison, our findings are similar to Lycke *et al*'s: prevalence of gonorrhoea was higher in male than female sexual contacts; while that for chlamydia was higher in female than male sexual contacts. Lycke *et al*'s and our findings on the transmission of *N gonorrhoeae* seem to contradict studies[5] which conform to the general view that efficiency of transmission of STDs is greater male-to-female than vice versa.

Whether co-existence of *N gonorrhoeae* and *C trachomatis* alters the biological behaviour of the microorganisms, and if so in what way, requires further study.

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Infertility due to *Chlamydia trachomatis* infection: what is the appropriate site for obtaining samples?

Chlamydia trachomatis infection of the upper genital tract often leads to "silent" infertility, through producing pelvic inflammatory disease (PID). After an episode of salpingitis, the post-infection infertility rate varies from 11 to 25%[1] however, there is little information on the aetiology, pathophysiology or the magnitude of the problem of asymptomatic tubal

infections leading to infertility. Despite the relative benign signs and symptoms that *C trachomatis* produces, it causes severe tubal damage probably owing to the more subacute nature of chlamydial salpingitis. *C trachomatis* has been isolated from the lower genital tract in up to 46% and from the upper genital tract in 10·5% of cases of PID.[1] The organism has rarely been isolated from pouch of Douglas specimens obtained by culdocentesis.[2] Tubal occlusion is commonly associated with the presence of chlamydial antibody; however, their presence does not always correlate with the isolation of *C trachomatis* from the fallopian tube.[3] Antibodies to *C trachomatis* occur less frequently and generally in lower titres in males than in females and up to 28% of male partners of women with chlamydial cervicitis have been found to be concurrently infected.[4]

In the present study *C trachomatis* isolation[5] was carried out in specimens obtained from the cervix (endocervical swab), endometrium (endometrial biopsy), fallopian tube and pouch of Douglas (laparascopic swab) in 39 infertile women to find the most appropriate site for diagnosis in these cases and to correlate with the presence of urine antigen and serum antibodies in both the male and female partners. A control group of 10 women undergoing laparascopic sterilisation was also included. Laparascopic swab specimens from the fallopian tube and pouch of Douglas were obtained with the help of atraumatic forceps[2] using a haemostatic swab (Surgicel, Johnson and Johnson, India). Chlamydiazyme diagnostic kit (Abbott Laboratories, USA) was used for urine antigen detection in male partners and the Virotech system (Diagnostics, Germany) was used for detecting *C trachomatis*-specific IgG/IgM antibodies. The Z test was applied for statistically estimating significance of differences in the results obtained.

C trachomatis was isolated from at least one sampling site (cervix, endometrium, pouch of Douglas, fallopian tube) in 17 (43·6%) cases of infertility and in none of the control cases. Specimens obtained laparascopically from the pouch of Douglas was most likely to be positive (16 cases, 41%) as compared with endocervical swab (9 cases, 23%), endometrial biopsy (3 cases, 7·6%) or laparascopic swab from fallopian tube (4 cases, 10·2%). This difference between *C trachomatis* positivity from the pouch of Douglas specimens as compared with the endocervical swab, endometrial biopsy and fallopian tube specimens was significant (Z = 2, 5·9 and 5·4 respectively). The pouch of Douglas provide a better site or environment for *C trachomatis* to grow than cervix, endometrium of fallopian tube and a higher rate of recovery of gonococci has been reported earlier from pouch of Douglas specimens. However, specimens obtained by culdocentesis for culture of *C trachomatis* have mostly been unsuccessful probably because of overgrowth by vaginal contaminants.[6] This may also be the reason for the more frequent recovery of *C trachomatis* from laparascopically obtained pouch of Douglas specimens in the present study. Being a noninvasive procedure overgrowth from vaginal contaminants in endocervical swab specimens has not been reported to be a frequent problem.

C trachomatis-specific IgG/IgM antibodies in females were present in 11 out of the 17 cases (65%) from whom *C trachomatis* was isolated from any of the sampling site. However, these antibodies were also found to be present in nine out of the 22 (40%) *C trachomatis* negative cases. This is in agreement with earlier studies as the serology for antichlamydial IgG/IgM antibodies may not correlate with the isolation of *C trachomatis* from the cervix, endometrium, fallopian tube or pouch of Douglas. Nine male partners of the 17 *C trachomatis*-positive female cases (53%) and 6 of the 22 *C trachomatis*-negative cases (27%) had *C trachomatis*-specific serum IgG/IgM antibody levels. This difference was significant ($p < 0·01$). All female partners of the nine males with *C trachomatis*-positive IgG/IgM antibodies were also positive for *C trachomatis* from at least one sampling site (pouch of Douglas in 3, cervix + pouch of Douglas in 3, cervix + pouch of Douglas + endometrial biopsy in 1 and cervix + pouch of Douglas + fallopian tube in 2). Enzyme immunoassay for *C trachomatis* antigen in urine samples of male partners was positive in only two out of 17 *C trachomatis*-positive women (table). A lower transmissibility of genital chlamydial infections (28% times) as compared with gonococcal infection (81% times) in males has also been reported earlier.[4]

Persistence of chlamydia in the female genital tract for years after an initial episode of salpingitis is controversial; however, its presence in the upper genital tract, particularly the pouch of Douglas in the silent-infertility producing PID and its absence in the control group may be significant.

Distribution of C trachomatis infection in sexual partners of infertility cases

Site	Female No positive		Male No positive	
	McCoy cell culture	*Serum IgG/IgM antibody*	*Urine antigen*	*Serum IgG/IgM antibody*
PoD	6	3	1	3
FT	—	—	—	—
Cx + EB	1	1	0	0
Cx + PoD	4	4	0	3
Cx + PoD + EB	2	1	0	1
Cx + PoD + FT	2	2	0	2
PoD + FT	2	0	1	0
Cx + FT	—	—	—	—
Sub total	17 (43·6%)	11 (28·2%)	2 (5·1%)	9 (23·0%)
C trachomatis negative in all samples PoD (Cx + EB + PoD + FT)	22	9	3	6
Total	39	20	5	15

Cx = Cervix; EB = Endometrial biopsy; FT = Fallopian tube; PoD = Pouch of Douglas.

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